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fiber, is employed as at least one of said red laser light source, said green laser light source, or said blue laser light source.

REMARKS

Claims 1-28 are pending in this application and stand rejected. By this Amendment Applicant has canceled claims 15-28, and revised claims 1 and 8. Claims 1 and 8 are independent.

This Substitute Amendment replaces the Amendment After Final Rejection filed on December 4, 2002, whose entry was requested in the Request for Continued Examination filed on February 12, 2003. This Substitute Amendment was necessitated because the December 4 Amendment inadvertently omitted clean versions of the revised claims, and such clean claims are presented herewith. This and the December 4 Amendment are otherwise the same in substance.

Support for the features added to claims 1 and 8 can be found throughout the application as filed, for example, at page 13, line 26, through page 14, line 2, page 16, lines 17-20, and page 17, lines 6-8.

The Rejections Under
35 U.S.C. § 103

Claims 1-23 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,317,348 to Knize in view of U.S. Patent No. 5,796,771 to DenBaars et al. Applicant respectfully traverses this rejection and submits the following arguments in support thereof.

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First, it will be appreciated that the cancellation of claims 15-23 renders moot the corresponding portions of this rejection. Withdrawal of those portions of the rejection is respectfully requested.

With regard to the remaining claims, Applicants respectfully submit that, for the following reasons, those claims patentably distinguish over the cited art.

Applicant's invention, as described in claim 1, involves a color laser display having a red, green and blue laser light sources for emitting, respectively, red, green and blue laser light, a modulation device for modulating the red, green and blue laser light, based on red, green and blue image signals, a screen for displaying red, green, and blue when irradiated with the red, green and blue laser light. A projection device projects the red, green and blue laser light onto the screen so that an image, carrying the red, green, and blue image signals, is displayed on the screen. An excitation solid laser unit, having a solid-state laser crystal doped with Pr 3^+ and a GaN semiconductor laser element emitting excitation light at a wavelength of 440 nm for exciting the solid-state laser crystal, is used as at least one of the red, green or blue laser light sources.

As set out in claim 8, this invention also pertains to a color laser display using red, green and blue laser light sources for emitting, respectively, red, green and blue laser light, a modulator for modulating the red, green and blue laser light based on red, green and blue image signals, a screen for displaying red, green, and blue when irradiated with the red, green and blue laser light, and a projector for projecting the red, green and blue laser light onto the screen so that an image carrying the red, green, and blue image signals is displayed on the screen. A fiber laser unit having a fiber with a Pr 3^+-doped core and a GaN semiconductor laser element emitting excitation light at a wavelength of 440 nm for exciting the fiber serves as at least one of the red, green or blue laser light sources.

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Support for the claim feature providing that the semiconductor laser element emits excitation light at a wavelength of 440 nm can be found in the specification at, for example, page 15, lines 8-15, page 16, lines 11-22, and page 17, lines 3-9.

Thus, it will be appreciated that, in this invention, the InGaN LD emits excitation light having a wavelength of 440 nm and the solid state laser crystal doped with $Pr3^+$ is oscillated with the emitted excitation light, and this makes it possible to provide RGB light with high efficiency (the light-to-light efficiency of about 30-50%) at an output on the order of 1W (watt), as discussed at page 8, lines 15-22, and page 13, lines 26, through page 14, line 3, of the specification. This high efficiency is achieved because the structure of the present invention is able to generate RGB light directly, without having to carry out any wavelength conversion. Further, by virtue of the present invention, the high efficiency is also realized because the output on the order of 1 W (watt) is available using the solid-state laser element doped with $Pr3^+$, as noted in the specification at, among other places, page 16, lines 7-10 and 20-22, and page 17, lines 6-9.

Knize teaches a fiber laser element doped with Pr but does not teach or suggest a laser element doped with Pr in which an InGaN LD having a wavelength ranging from 440 to 450 nm is used as a light source. Further, Knize does not teach emitting RGB light using the laser element doped with Pr. Specifically, with respect to red light, Knize merely teaches using an InGaP laser, and does not teach using a laser element doped with Pr.

DenBaars teaches using an InGaN LD as a light source for emitting excitation light, but does not teach the excitation wavelength of the InGaN LD which excites the laser element doped with Pr. Further, DenBaars does not even suggest that the three elemental colors (i.e., RGB) of the light are obtained with the excitation wavelength of the laser element doped with Pr.

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In the InGaN LD, the laser oscillation is obtained at a wavelength of 380 to 460 nm. Specifically, the oscillating wavelength of 440 nm is the limit wavelength for realizing high outputs. Further, the laser element doped with Pr has a plurality of excitation wavelengths, such as 440 nm, 470 nm, 48 nm and the like. However, among the plurality of excitation wavelengths, the excitation wavelength of 440 nm provides the highest efficiency. None of the references, whether taken alone or in combination, even suggests the combination of the InGaN LD for emitting excitation light at a wavelength of 440 nm, and the laser element doped with $Pr3^{+}$.

Further, none of the references teaches or suggests that the three elemental colors (i.e., RGB) of light are all obtained using this combination.

The remaining rejected claims, claims 2-7 and 9-14, all ultimately depend from, and so incorporate by reference all the features of, claims 1 and 8, including those features already shown to avoid the cited art. These claims therefore patentably distinguish over such art at least for the same reasons as their respective base claims.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

Claims 24-28 were rejected under 35 U.S.C. § 103 as being unpatentable over Knize in view of DenBaars as previously applied to claim 15, and further in view of U.S. Patent No. 5,727,016 to Paxton. Applicant respectfully traverses this rejection and submits the following arguments in support thereof.

In view of the cancellation of claims 24-28, this rejection is now moot. Accordingly, withdrawal of this rejection is proper

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CONCLUSION

Applicant respectfully submits that all outstanding rejections have been addressed and are now either overcome or moot. Applicant further submit that all claims pending in this application are patentable over the prior art. Reconsideration and withdrawal of those rejections and objections is respectfully requested.

Favorable consideration and prompt allowance of this application is respectfully requested. In the event that there are any questions, or should additional information be required, please do not hesitate to contact applicant's attorney at the number listed below.

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Attachment: "Version With Markings to Show Changes Made"

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IN THE CLAIMS:

Please cancel claims 15-28 without prejudice to, or disclaimer of, the subject matter presented therein.

Amend claims 1 and 8:

1. (Amended) A color laser display comprising:

a red laser light source for emitting red laser light;

a green laser light source for emitting green laser light;

a blue laser light source for emitting blue laser light;

modulation means for modulating said red laser light, said green laser light, and said blue laser light, based on a red image signal, a green image signal, and a blue image signal;

a screen for displaying red, green, and blue when irradiated with said red laser light, said green laser light, and said blue laser light; and

projection means for projecting said red laser light, said green laser light, and said blue laser light onto said screen so that an image, carrying said red, green, and blue image signals, is displayed on said screen;

wherein an excitation solid laser unit, having a solid-state laser crystal doped with Pr^{3+} and a GaN semiconductor laser element <u>emitting excitation light at a wavelength of 440 nm</u> for exciting said solid-state laser crystal, is employed as at least one of said red laser light source, said green laser light source, or said blue laser light source.

8. (Amended) A color laser display comprising:

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a red laser light source for emitting red laser light;

a green laser light source for emitting green laser light;

a blue laser light source for emitting blue laser light;

modulation means for modulating said red laser light, said green laser light, and said blue laser light, based on a red image signal, a green image signal, and a blue image signal;

a screen for displaying red, green, and blue when irradiated with said red laser light, said green laser light, and said blue laser light; and

projection means for projecting said red laser light, said green laser light, and said blue laser light onto said screen so that an image, carrying said red, green, and blue image signals, is displayed on said screen;

wherein a fiber laser unit, having a fiber with a Pr 3+-doped core and a GaN semiconductor laser element <u>emitting excitation light at a wavelength of 440 nm</u> for exciting said fiber, is employed as at least one of said red laser light source, said green laser light source, or said blue laser light source.

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